材料与化工(085600)全日制博士培养方案

Materials and Chemical Engineering

一、基本信息 Basic Information

院 系 名 称 School	(160)环境科学与工程学院 School of Environmental Science & Engineering		适 用 年 级 Grade	2025
适 用 专 业 Major	材料与化工(085600) Materials and Chemical Engineering			
项 目 类 型 Program Type	全日制博士			
最 低 学 分 Min Credit	11	最低GPA学分 Min GPA Credit	0	最低GPA Min GPA	0

二、学科简介 Introduction

1984年获准环境化学硕士点，开始培养环境领域硕士生，1998年调整为环境工程硕士点，同年又获准环境科学硕士点，2000年获准环境工程二级学科博士点，2003年获准环境科学与工程一级学科博士点，同年设立环境科学与工程博士后流动站。在流域水污染控制、区域大气污染控制、废弃物资源化、环境功能材料、土壤-地下水污染修复、环境化学与毒理学、环境管理、海洋环境等方向，具有鲜明的特色与厚重的积累。学院拥有完善的教学与科研体系和先进分析测试平台，承担着大量的国家级、省部级、国际合作以及企业委托的科研项目。

As early as the 1984 we began to cultivate the master's students in environmental field. It was adjusted to the master degree of environmental engineering in 1998. The environmental science master station was established at the same year. In 2000, a second-rate discipline of environmental engineering for doctor-degree program was established. The first-rate discipli of environmental science and engineering for doctor-degree program was established in 2003. The school was approved to have post-doctoral mobile center of first class discipline of Environmental Science and Engineering in 2003.
The major research fields are regional water pollution control, regional air pollution control, solid waste treatment and disposal, environment function materials, soil and groundwater remediation, environmental chemistry and toxicology, environmental management, marine environment, etc. The school has advanced teaching and research system, and the public servic platform, the center laboratory, guarantees the advanced analysis and test. The school also undertakes many national, international and industrial scientific research projects.

三、培养目标 Program Objective

总体目标：培养具有坚定的科学信念、坚忍不拔的科学意志、敏锐的科学触角、广阔国际视野并且具有较高学术水平的一流人才。 培养德、智、体、美、劳全面发展，热爱祖国、遵纪守法、品行端正，具有艰苦奋斗、为人民服务和为社会主义建设事业献身的精神，热爱环境保护事业，具有扎实的基础理论与系统的专门知识，熟悉环境学科在国内外发展的历史、现状及趋势，在某一具体研究方向上取得突破性进展，熟练掌握英语，能够撰写高水平研究论文，具备批判思维、创新能力、实践能力与全球视野，具有较强的解决和探索环境污染控制、生态文明建设等问题的能力，具有从事科学研究工作或担负专门技术工作能力的环境科学与工程领域的卓越人才。

We will cultivate all-round development of morality, intelligence, body and beauty, love the motherland, abide by the law, and behave in a proper manner. We will have the spirit of hard work, serving the people and dedicating ourselves to the cause of socialist construction. We love the environmental cause and master the solid and broad environmental engineering of this discipline. The theoretical foundation and systematic in-depth expertise, familiar with the history, current situation and trend of environmental discipline development at home and abroad, with good critical thinking, innovation ability and practical ability, have strong ability to solve and explore environmental pollution control problems, The ability to independently engage in scientific research, management, and practical work, to create creative results in environmental science or expertise, and to have high-level talents with a global environmental perspective.

四、培养方式及学习年限 Training Mode and Study Duration

本项目标准学制为4年，采用全日制学习、校企导师联合培养模式。非专项培养工程博士须单独在合作导师所在单位联合培养；专项培养博士需从第二年开始在单位进行联合培养。未能如期完成学业者，博士生可最长可延长2学年。

This program requires a full-time study for 3-4 years under a supervisor. Upon approval of the application, the maximum period of study can be extended by two years.

五、课程学习要求 Course Requirement

课程类别	学分要求	GPA 学分要求	备注

Course Type	Min Credits	Min GPA Credit	Note
公共基础课 General Fundamental Courses	5		
专业基础课 Program Core Courses	2		
专业前沿课 Program Frontier Courses	2		
专业选修课 Program Elective Courses	2		

六、培养过程要求 Training Requirement

课程总学分11学分，原则上第一年完成，所修课程应区别于硕士阶段课程。
一、课程学习
完成时间：普博生原则上第2学期结束前完成，不能晚于第4学期；直博生原则上第3学期结束前完成，不能晚于第5学期。
二、资格考试
完成时间：普博生原则上第3学期结束前完成，不能晚于第5学期；直博生原则上第4学期结束前完成，不能晚于第6学期。
前提要求：参加资格考试时，学生应已按培养计划进度完成专业基础课的学习。未完成专业基础课学习者、因故休学者或有其它特殊原因者，可申请推迟参加资格考试。参加国际联培的博士生原则上应在访学前通过资格考试。
评审组织：资格考试分为笔试和面试部分，由学院集中组织。
归档要求：学生在交我办(my.sjtu.edu.cn)发起申请并完成在线归档，附件须完备。
三、开题报告
完成时间：资格考试通过后一年内完成，一般10月底前完成（因故休学者或有其它特殊原因者，可申请推迟博士论文开题；参加国际联培的博士生若出访前未进行开题报告，可在合作高校举行论文开题工作）。
评审组织：论文开题报告会由课题组或导师具体组织实施，专家组应由35名具有博士生指导资格的教师组成。
归档要求：学生在交我办(my.sjtu.edu.cn)发起申请并完成在线归档，附件须完备。
四、年度考核
完成时间：每年10月底前完成，论文开题通过满六个月以上者应参加。
评审组织：年度报告会由课题组或导师具体组织实施，专家组应由35名具有博士生指导资格的教师组成。
归档要求：学生在交我办(my.sjtu.edu.cn)发起申请并完成在线归档，附件须完备。
五、学术交流
完成时间：就读期间（正式答辩前）须在高水平国际学术会议上作学术交流至少1次。
交流形式：交流形式包括口头报告、墙报展示，或投稿的论文摘要被会议录用等，交流内容应与博士学位论文研究工作密切相关。
六、工程实践
在联培单位需累计开展不少于一年的工程实践，由校企导师组提供联合指导。具体要求：
应在第三学年结束前完成工程实践课程并通过考核。考核结果为“通过”或“不通过”，由院系教务在必修环节录入《工程实践I》、《工程实践II》的课程成绩。

Students need to complete credits of 11, course learning in principle required to complete within 1 years.
1. Course Learning
Time of completion: In principle, for normal doctoral candidates, it should be completed before the end of the second semester, and not later than the fourth semester; as for doctoral candidates after bachelor's degree, it should be completed before the end of the third semester, and not later than the fifth semester.
2. Qualification Examination
Time of completion: In principle, for normal doctoral candidates, it should be completed before the end of the third semester, not later than the fifth semester; as for doctoral candidates after bachelor's degree, it should be completed before the end of the fourth semester, and not later than the sixth semester.
Prerequisites: When taking the qualification exam, students should have completed courses learning. Doctoral students of international joint cultivation program should, in principle, pass the qualification test before attending the foreign university.
Review Organizing: Organized by the school collectively.
Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing procedure.
3. Thesis Proposals
Time of completion: In principle, it should be completed within one year after passing the qualification exam, usually held in October (doctoral students of international joint cultivation program can hold it in the foreign university).
Exception: The thesis proposals representation is held simultaneously with qualification examination for Class of 2019 and before.
Review Organizing: Held by the supervisor, and the review committee consists of 3 or 5 professors with the qualification of doctoral tutor.
Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing procedure.
4. Annual Progress Reports
Time of completion: Generally in October, students who have passed the thesis proposal for more than six months should participate.
Review Organizing: Held by the supervisor, and the review committee consists of 3 or 5 professors with the qualification of doctoral tutor.
Filing: Students should apply and file on my.sjtu.edu.cn with complete reports and reviewing procedure.
5. Academic Exchange
Time of completion: During the study period (before the formal thesis defense), students must participate at least once at a high-level international academic conference with the followin forms of achievements.
Manners of achievements: The forms of achievements include oral reports, poster presentations, or the abstracts of the submitted papers are accepted by the conference, etc. The content the communication should be closely related to the research work of the doctoral dissertation.

七、学术成果要求 Requirement on Academic Achievements

（一）创新性成果具体要求

1在《上海交通大学环境科学与工程学院代表性期刊分类目录》所列期刊上公开发表（或录用）学术论文1篇，同时提交以下研究成果之一：

⑴ 获得国家级或省部级科技成果奖3项，其中国家级科技成果奖和省部级科技成果一等奖需排名前位，省部级科技成果二等奖需排名前位；

⑵ 以本人贡献为主的研究成果形成国际标准、国家标准或行业标准1项，要求本人排名前位；

⑶ 以第一发明人或第二发明人（导师为第一发明人）获得发明专利授权1项并有良好应用。

2发表学术论文达到相应学科（环境科学与工程）学术型博士创新成果要求；

3经学院学位评定委员会认定的其他形式创新性成果。

（二）创新性成果认定办法

1学术论文第一作者及通讯单位应为上海交通大学环境科学与工程学院，且导师为作者之一；学生第一作者，按1篇计；导师第一、学生第二的，按0.5篇计；共同一作的，仅计算排名第一的共同作者，按1篇计。

2国家级或省部级科技成果奖的获奖单位应包含上海交通大学。

3发明专利是由国家知识产权局、PCT等组织授权的发明专利，全日制博士生授权发明专利第一完成单位应为上海交通大学，非全日制博士生授权发明专利完成单位应包含上海交通大学。

4国际或国家标准须由中国国家标准管理委员会、ISO、IEEE、ASME等国际标准化组织制定的标准；行业标准是由相关行业主管部门统一管理的标准。标准的制定单位需包含上海交通大学。

5一项研究成果原则上仅用于一位博士生作为代表性成果申请学位。

(1) Specific requirements for innovative achievements

1. Publicly publish (or accept) one academic paper in the journals listed in the "Classified Catalogue of Representative Journals of the School of Environmental Science and Engineering of Shanghai Jiaotong University", and submit one of the following research results at the same time:

(1) Obtain 1 national or provincial scientific and technological achievement award, among which the national scientific and technological achievement award and the first prize of provinci and ministerial scientific and technological achievement must be ranked in the top 5, and the second prize of provincial and ministerial scientific and technological achievement must be ranked in the top 3 ；

(2) The research results based on my own contributions form 1 international standard, national standard or industry standard, and I am required to rank in the top 3;

(3) The first inventor or the second inventor (the tutor is the first inventor) obtains 1 invention patent authorization and has a good application.

2. Published academic papers to meet the requirements of academic doctoral innovation achievements in corresponding disciplines (environmental science and engineering);

3. Other innovative results recognized by the Academy Degree Evaluation Committee.

(2) Methods for identifying innovative achievements

1. The first author of the academic paper and the corresponding unit should be the School of Environmental Science and Engineering, Shanghai Jiaotong University, and the supervisor is one of the authors; the first author of the student is counted as 1; the first author of the tutor and the second of the student are counted as 0.5 Count; if a work is co-authored, only the first co-author will be counted, and it will be counted as one.

2. The award-winning units of the National or Provincial Science and Technology Achievement Award should include Shanghai Jiaotong University.

3. Invention patents are invention patents authorized by the State Intellectual Property Office, PCT and other organizations. The first completion unit of a full-time doctoral student's authorized invention patent should be Shanghai Jiao Tong University, and a part-time doctoral student's authorized invention patent should be completed by Shanghai Jiaotong University the University.

4. International or national standards include the standards established by the China National Standards Administration, ISO, IEEE, ASME and other international standardization organizations; industry standards are standards that are managed uniformly by relevant industry departments. The standard-setting unit must include Shanghai Jiaotong University.

5. In principle, a research result can only be used by one doctoral student as a representative result to apply for a degree.

八、学位论文 Thesis/dissertation work

学位论文是进行学位评定的主要依据（专业学位博士也可通过规定的实践成果进行学位评定，实践成果评审方式视具体情况另行规定），应能表明作者在本学科上掌握坚实宽广的基础理论、系统深入的专门知识和熟练运用科研方法。

1.选题与综述

博士学位论文的选题应在本学科及相关领域具有开拓性、前沿性和创新性，应对经济建设和社会发展具有较大的理论意义或应用价值。文献综述应在全面搜集、阅读大量有关研究文献的基础上，经过归纳整理、分析鉴别，对所研究的问题在一定时期内已经取得的研究成果、存在问题及发展趋势等进行系统、全面、客观的叙述和评论，为论文课题的确定提供支持和论证。

2.规范性要求

博士学位论文必须是一篇系统、完整的学术论文，是学位申请者在导师指导下独立完成的研究成果，不得抄袭和剽窃他人成果，能够表明作者具有独立从事科研和院工作的能力，且在本门学科上掌握了坚实宽广的基础理论和系统深入的专业知识。

博士学位论文的学术观点必须明确、立论正确、推理严谨、数据真实、图表规范、层次分明、语言准确、且文字通畅。

博士学位论文字数一般为8~10万，论文中使用的术语、符号、代号必须全文统一并符合规范化要求。计量单位一律采用国务院发布的《中华人民共和国法定计量单位》。根据国家标准《学位论文编写规则》(GB7713.1)，学位论文应使用中文撰写。国际留学生或申请国际评审与答辩的论文可以用英文撰写论文但必须列出详细的中文摘要。学位论文撰写格式应符合《上海交通大学博士、硕士学位论文撰写指南》要求。

3.成果创新性要求

博士学位论文相关创新成果应在本学科领域体现一流水平、具有创造性；成果应为学位申请人攻读博士学位期间独立完成，并以学位论文的形式完整呈现。

成果的创新性是评价学位论文水平的重要参考，可通过高水平的学术期刊论文、学术会议论文、专著、专利、作品、研究报告等多种形式呈现。

The dissertation is the main basis for degree evaluation, and it should reflect that the author has mastered a solid and broad basic theory, systematic and in-depth expertise and standardized scientific research methods in the subject.

1. Topic selection and summary

The topic selection of a doctoral dissertation should be pioneering, cutting-edge and innovative in this discipline and related fields, and have greater theoretical significance or applicatio value in response to economic construction and social development. The literature review should be based on a comprehensive collection and reading of a large number of relevant resear literature, through induction, sorting, analysis and identification, and a systematic and comprehensive analysis of the research results, existing problems, and new development trends tha have been achieved within a certain period of time. , Objective narratives and comments provide support and demonstration for the establishment of the thesis topic.

2. Normative requirements

The doctoral dissertation must be a systematic and complete academic thesis. It is the research result independently completed by the applicant under the guidance of the supervisor. It is not allowed to plagiarize or plagiarize the results of others. It can show that the author has the ability to independently engage in scientific research and is in this He has mastered solid a broad basic theories and systematic and in-depth professional knowledge in the subject.

The academic point of view of the doctoral dissertation must be clear, correct, rigorous in reasoning, truthful in data, standardized in diagrams, clear in layers, accurate in language, and unobstructed in text.

The number of words in a doctoral dissertation is generally 80,000 to 100,000. The terms, symbols, and codes used in the dissertation must be unified in the full text and meet the standardization requirements. All units of measurement shall be the "Statutory Units of Measurement of the People's Republic of China" issued by the State Council. According to the national standard "Rules for Writing Dissertations" (GB/T 7713.1), dissertations should be written in Chinese. International students or essays applying for international review and defens can write essays in English, but a detailed Chinese abstract must be listed. The format of dissertation writing should meet the requirements of "Guidelines for Writing Doctoral and Master Thesis of Shanghai Jiaotong University".

3. Innovative requirements for results

The innovative achievements related to the doctoral dissertation should reflect the first-class level and creativity in the subject field; the achievements should be completed independentl by the degree applicant during the period of studying for the doctoral degree, and be fully presented in the form of a dissertation.

The innovation of the results is an important reference for evaluating the level of the dissertation, which can be presented in various forms such as high-level academic journal papers, academic conference papers, monographs, patents, works, and research reports.

九、课程设置 Courses

详见下页 Please refer to the next page.

撰稿人签字：　　日 期：

校稿人签字：　　日 期：

审核人签字：　　日 期：

主管院长签字：　　院系公章　　日期：

课程类别 Category	课程代码 Course Code	课程名称 Course Name		学分 Credit	授课语言 Language	开课学期 Semester	是否必修 Compusory	可以计算GPA	必须计算GPA	备注 Note	多选组 Course Group
		中文Chinese	English 英文								
任意选修课 Elective Courses	GE6007	大学生心理健康	Mental Health for College Students	2	中文	春秋季	是	否	否	好大学在线	
公共基础课 General Fundamental Courses	GE9003	工程实践I	Engineering Practice I	1	中文	春秋季	是	否	否		最少2门、最低2分
	GE9004	工程实践II	Engineering Practice II	1	中文	春秋季	是	否	否		最少2门、最低2分
	BIO8007	生命科学前沿：合成生物学	Frontier of Life Science: Synthetic Biology	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9102	化学前沿专题：化学生物学	Frontier Topics in Chemistry: Chemical Biology	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9104	化学前沿专题：新能源化学	Frontier Topics in Chemistry: New Energy Chemistry	1	中文	春季	是	否	否		最少1门、最低1分
	CHEM9105	化学前沿专题：材料化学	Frontier Topics in Chemistry: Materials Chemistry	1	中文	春季	是	否	否		最少1门、最低1分
	MATH8004	现代数学专题-计算类：最优化	Special Topics in Modern Mathematics-Computational Mathematics: Optimization	0.5	中文	春季	是	否	否		最少1门、最低1分
	STAT8003	现代数学专题-随机类：现代统计	Special Topics in Modern Mathematics-Stochastic: Modern Statistics	0.5	中文	春季	是	否	否		最少1门、最低1分
	MARX7001	中国马克思主义与当代	Marxism in China	2	中文	春秋季	是	否	否		
专业基础课 Program Core Courses	ENVR7005	大气污染控制理论与技术	Theories and Technology of Air Pollution Control	2	中文	秋季	否	否	否		
	ENVR7101H	高等环境化学	Advanced Environmental Chemistry	3	英文	秋季	否	否	否		
	ENVR7110	环境能源技术	Environmental Energy Technology	2	英文	秋季	否	否	否		
	ENVR7004H	水污染控制理论与技术	Theory and Technology for Water Pollution Control	3	中文	春季	否	否	否		
	ENVR7006	废弃物的处理与资源化	Solid Waste Disposal And Recycling	2	中文	春季	否	否	否		
	ENVR7020	环境学科人工智能应用实践	Artificial Intelligence in Environmental Science	2	中文	春季	否	否	否	AI+	
	ENVR7102H	环境管理	Environmental Management	2	英文	春季	否	否	否		
专业前沿课 Program Frontier Courses	ENVR7016	铁环境化学与污染控制技术	Iron Environmental Chemistry and Pollution Control Technology	2	中文	秋季	否	否	否		
	ENVR9001	环境科学与工程学科前沿进展	Frontiers of Priority of Environmental Engineering	3	中文	秋季	否	否	否		
	ENVR9002	碳中和与气候变化研究前沿	Research Frontiers of Carbon Neutrality and Climate Change	2	中文	春季	否	否	否		
	ENVR9003	工程经济学	Engineering Economics	2	中文	春季	否	否	否		
专业选修课 Program Elective Courses	ENVR7007	环境污染与控制化学	Chemistry of Environmental Pollution and Control	2	中文	秋季	否	否	否		
	ENVR7008	环境催化与环境功能材料专题	Environmental Catalysis and Functional Materials	2	中文	秋季	否	否	否		
	ENVR7009	高等环境毒理学	Advanced Enviromental Toxicity	2	中文	秋季	否	否	否		
	ENVR6012	气溶胶物理与化学	Aerosol Physics and Chemistry	2	中文	春季	否	否	否		